more flexed and diverging position to enable the head of the animal in browsing to approach nearer to the ground. The bony cores on the skull were sheathed in horn as well as the beaks, and there is evidence of a dermal armature of bosses and spines which once covered the dorsal and lateral region of the creature's body. Mr. Charles R. Knight has given a spirited restoration of this animal in the *Century Magazine* (1897, p. 18). A life-size *papier-maché* reproduction of Triceratops has been made in America by Mr. Lucas, and it is to be hoped a copy may shortly be secured for the Natural History Museum in Cromwell Road. H. W.

NOTES.

The King has conferred the honour of Knighthood upon Prof. A. Pedler, C.I.E., F.R.S., Director of Public Instruction, Bengal, and Vice-Chancellor of the Calcutta University.

We are requested to announce that the endowment fund now being raised for the family of the late Prof. G. B. Howes, F.R.S., will be closed shortly, and all intending contributors are asked to send their contributions without delay to the treasurer, Mr. Frank Crisp, at 17 Throgmorton Avenue, London, E.C.

At a meeting of the Academy of Natural Sciences of Philadelphia on December 5, 1905, Dr. Dixon announced that Mr. D. M. Barringer and Mr. B. C. Tilghman, members of the academy, had notified him of their discovery that the crater of Coon Mountain, or Coon Butte, in northern Arizona, twelve miles south-east of Cañon Diablo station on the Atchison, Topeka and Santa Fé Railway, is an impact crater, and not a crater produced by a steam explosion, as has been supposed since the examination made of it by members of the United States Geological Survey. It appears from their work that the large crater and elevation known as Coon Mountain is the result of a collision with the earth of a very large meteorite or possibly a small asteroid, fragments of which are well known to the scientific world by the name of the Cañon Diablo siderites. The investigations show (1) that the formation of the crater and the deposition of the meteoritic material were simultaneous; (2) that meteoritic material has been found 500 feet below the surface of the centre of the crater; (3) that sandstone supposed to be in place exists less than 1000 feet below the surface of the centre of the crater. The authors have presented to the academy for publication two comprehensive papers in which they set forth in full their reasons for the above statements.

A copy of the programme of the excursions arranged in connection with the International Geological Congress, to be held in Mexico during next September, has just reached us. Excursions will take place before, during, and after the congress. Before the business meetings actually begin, four excursions are provided for visitors. The first excursion, which will last four days and be confined to 250 persons, is to be to the east from Mexico through Jalapa to Vera Cruz, returning to Mexico through Esperanza. The second excursion to the south is to extend to eight days, and is limited to 40 persons. Arriving at Esperanza, included in the first trip, the party will proceed to Tehuacan and thence to Oaxaca. Puebla will be taken on the return journey. The third excursion, confined to 30 members, will include visits to the volcanoes of Toluca, San Andrés, and Jorullo, and will last fourteen days, nine of which will be on horseback. The last of these trips is to the geyser district of Ixtlán and to the volcano, Colima. During the progress of the congress short journeys will be made to Pachuca, to Cuernavaca, and other places near Mexico. At the close of the conferences an excursion to the north, of twenty days, will take place. Salamanca, Guanajuato, Zacatecas, Mapimí, Conejos, Ciudad, Parras, and other localities will be visited. Another excursion after the meeting will be to the isthmus of Tehuantepec. The following subjects will be discussed at the congress:—(1) Climatic conditions during the geological epochs, when Messrs. G. Boehm, T. C. Chamberlin, W. B. Clark, W. H. Dall, W. M. Davis, A. Heilprin, V. Uhlig, and S. W. Williston will take part. (2) The relations between tectonics and eruptive masses: Messrs. A. Bergeat, A. Dannenberg, G. K. Gilbert, J. P. Iddings, A. Karpinski, A. Lacroix, and E. Naumann will speak. (3) The genesis of metalliferous veins: Messrs. B. von Inkey, F. Klockmann, W. Lindgren, W. B. Phillips, J. E. Spurr, and W. H. Weed will participate. (4) The classification and nomenclature of rocks: Messrs. Wh. Cross, J. P. Iddings, A. Karpinski, A. Lacroix, A. Osann, W. B. Phillips, H. S. Washington, and F. Zirkel will take part in the discussion. Communications may be addressed to the general secretary, M. Ezequiel Ordóñez, 5*a* del Ciprés, No. 2728, Mexico, D. F.

The stone implements of the Zambesi valley near Victoria Falls, noted by Mr. Lamplugh in his report on the district (see Nature, p. 112), and more fully described by Colonel Feilden in a letter recently printed in Nature (p. 77), possess much interest in view of their possibly high antiquity. At a meeting of the Geological Society of South Africa on October 30, 1905, Mr. J. P. Johnson, of Johannesburg, in giving an account of a further collection of these implements which he had made during a recent visit to the falls, stated that some of the specimens appear to show the transitional stage between the Eolithic and Palæolithic cultures. In the same paper the occurrence of implements of the "pygmy" type near Bulawayo is recorded.

In the second part of the *Bergen's Museums Aarbog* for 1905, Mr. P. Bjerkan describes the ascidians collected by the Norwegian fishery-steamer *Michael Sars* from 1900 to 1904, while Mr. H. Brock does the same for the hydroid polyps obtained during the last two years. Three ascidians regarded as new are named by the former author, one of these representing a new genus; but all the hydroids appear to be identified with previously known forms. The organisation of Cephalodiscus has been recently fully investigated by Dr. H. Schepotieff, who records the results of his studies in a third article; while Mr. O. Bidenkap supplies a list of Arctic bryozoans.

To the October issue of the *Proceedings of the Philadelphia Academy of Sciences* Dr. J. W. Haishberger contributes two interesting papers on the flora of the Bermudas. In the first of these the general character of the flora, which is evidently of comparatively recent introduction, is discussed, and the different zones described. The second paper, on the other hand, is devoted to an explanation of the origin of the curious "hour-glass-conformation" of the stem of the Bermuda palmetto (*Sabal blackburniana*), long ago described in a letter from Mr. O. A. Reade to Sir Joseph Hooker. The explanation, according to the author, is simplicity itself, the constrictions being caused by unfavourable seasons of excessive drought.

In a recent issue (vol. xxi., art. 14) of the Bulletin of the American Museum, Prof. H. F. Osborn describes two new generic types of carnivorous dinosaurs from the

Laramie Cretaceous, namely, *Tyrannosaurus rex* and *Dynamosaurus imperiosus.* The former appears to have been unprovided with armour, and is estimated to have measured 39 feet in length; it walked on the hind-limbs only, with the top of the skull raised about 19 feet from the ground. On the other hand, Dynamosaurus was an armoured type with about a dozen lower teeth, and a number of curious prominences on the inner margin of the jaw. In this comparatively small number of teeth it seems to differ from Leidy's Dinodon, in which some of the teeth were serrated. A third type, *Albertosaurus sarcophagus,* is based on a skull from Albert province, Canada. It is apparently more specialised than Dinodon in the reduction of the truncated anterior teeth, and more primitive than Dynamosaurus in the possession of a larger number of teeth, which are of a less specialised type.

WE have received four numbers (inclusive of one devoted to the record of last year's meetings) of the fourteenth volume of the *Transactions of the Academy of St. Louis.* In the bulkiest of these, comprising no less than 248 pages, Mr. T. L. Casey revises the American representatives of that section of the staphylinid or short-elytraed beetles known as the Pœderini, the memoir being, of course, interesting only to specialists. In a second paper Mr. S. Weller describes, under the name of Paraphorhynchus, a new genus of rhynchonella-like brachiopods from the Kinderhook formation of the Mississippi. In a third paper the fresh-water molluscan fauna of McGregor, Iowa, forms the subject. Mr. F. C. Baker communicates some interesting information with regard to the pearl-fishery of that district. The unios are fished up by means of a dredge armed with four-pronged "crowfoot" hooks, and it is believed that malformed specimens are more likely to contain pearls than those with normal shells. These "crippled" mussels, or "clams," are believed by the writer to owe their injuries to the action of the dredge itself.

THE last published number of *Biometrika* contains an important paper by Mr. A. O. Powys on fertility, duration of life and reproductive selection in man, with their mutual relations. Several of his results, which are derived from the statistical data of New South Wales, are of high interest. He finds that women with families of five or six children have a better expectation of life after forty-five than mothers of either a larger or smaller number of offspring. The married have a similar advantage over the single. Another conclusion drawn by Mr. Powys from his figures is that "up to the present there is but little Malthusian restraint upon the population in New South Wales—what little there may be apparently being confined to the professional, domestic and commercial classes." He confirms Prof. Karl Pearson's view that society is at present being recruited from below—mainly from the artisan class. A useful craniological contribution to the study of inter-racial correlation in man is furnished by E. Tschepourkowsky, of Moscow, and Mr. E. H. J. Schuster publishes the first instalment of a catalogue of the fine collection of skulls in the Oxford Museum, on the basis of a manuscript catalogue prepared some years ago by Dr. Hatchett Jackson. Dr. Brownlee puts the facts of the immunity against small-pox conferred by vaccination and re-vaccination on a firm statistical basis, and Mr. John Blakeman supplies probable error tests of the significance or otherwise of the difference between correlation ratio and coefficient, and consequently of the existence or non-existence in a given population of true linear regression. Mr. Latter deals with the measurements of 1572 specimens of cuckoos' eggs. These, he considers, tend to confirm Prof. Newton's suggestion that there are certain subraces of cuckoos which "in the main confine their attentions, generation after generation, each to its own particular variety of foster-parent." In the "Miscellanea," Mr. W. Palin Elderton proposes new methods for the calculation and adjustment of moments.

MR. J. H. HART, the superintendent of the Royal Botanic Gardens, Trinidad, records the discovery of a water-plant, probably a species of Nitella, in the Pitch Lake La Brea, which produces peculiar pear-shaped organs on the stems. These are hollow, and have large openings into the interior, fringed with simple or branched hairs, and within some of them mosquito larvæ were observed, apparently caught and killed by the plant. The suggestion, therefore, is made that the plant might be useful for mosquito destruction.

THE use of copper sulphate in the purification of water supplies has from time to time been referred to in these columns. Dr. Howard Jones, the medical officer of health for Newport, Mon., reports the successful employment of the method at Newport. Copper sulphate, to the extent of 1 lb. per million gallons, proved efficient in removing an objectionable fishy odour and rendering the water of the reservoirs bright and clear (*Water*, December 15, 1905).

AT a meeting of the Royal Statistical Society on December 19, 1905, Drs. Newsholme and Stevenson read an important paper on the decline of human fertility in the United Kingdom and other countries as shown by corrected birth-rates. They pointed out that corrected birth-rates measure the tendency of communities to increase by natural means, *i.e.* by the excess of births over deaths, or, in other words, their fertility, just as corrected death-rates measure the tendency to decrease. The ordinary "crude" birth-rate is deceptive, since it fails to make allowance for the fact that some populations include a much larger proportion than others of wives at reproductive ages, and for the further fact that the potential fertility of women steadily decreases during the reproductive period until its end is reached. The necessity for correction was illustrated by numerous examples. Thus the crude birth-rate of Ireland in 1903, 23·1, is little higher than that of France in 1902, which was 21·7; but the French birth-rate is practically unaltered by correction, whereas that of Ireland is increased to no less than 36·1. This remarkable result is due to the fact that, although both countries have approximately the same proportion of women aged fifteen to forty-five in their populations, 52·5 per cent. of these in France are married as against 32·5 per cent. in Ireland. Of the countries studied, Ireland alone shows an increase of fertility (3 per cent.) during the last twenty-two years. The conclusion arrived at is that the decline in the birth-rate is associated with a general raising of the standard of comfort, and is an expression of the determination of the people to secure this greater comfort; and the authors anticipate as a result a deterioration of the moral, if not also of the physical, nature of mankind.

Ciel et Terre for November 15, 1905, contains a useful summary of an elaborate discussion by M. A. Angot on the temperature of France and adjoining countries. The original paper appeared in a recent number of *Annales de Géographie*; it deals chiefly with the temperature of France, to which the following remarks entirely refer. As regards the annual means, the isotherms in the north of the country show a decided inclination from north-west to south-east; this is due to the fact that, generally speaking, the land is colder than the sea above lat. 45°, and warmer to the south of that latitude. The lowest mean value is found between Lille and Dunkirk, being about 49° F.; the maximum is on the coast of Nice, and is slightly above 59°. Except on part of the coast of Brittany, the whole of France lies in the zone of moderate climates, in which the annual amplitude is between 50° and 68°. The lowest minima are found in the east; in the winter of 1879–80, temperatures of −22° were recorded. Contrary to current opinion, the highest minima are not on the coast of Nice, where occasionally the cold is very severe, but on the south-west of Brittany and at Ushant, where frost is extremely rare. In the latter regions the absolute maxima are not so high as in other parts. At Ushant a reading of 86° has not been recorded. The highest maxima are found near the Mediterranean, between Carcassonne and Avignon. At Montpellier, a temperature of 109° was recorded on July 19, 1904; this is the highest reading known in France. The details of the discussion are being published in the *Annales* of the French Central Meteorological Office.

IN the *Engineering Magazine* for December, 1905, Mr. E. Guarini gives some striking illustrations of the electric railway at Gruyères. The description is typical of much of the work now being done in the construction of electric railways in Switzerland, where the abundant water-power is especially favourable to the development of such enterprises.

IN the *Engineering and Mining Journal* Mr. F. L. Hoffman gives details of the fatal accidents in coal mining in the United States in 1904. The fatal accident rate was 3·38 per thousand workmen employed, as against an average of 3·03 per thousand for the decade 1895–1904. The relative mortality due to fatal accidents continues to be unreasonably high, and the problem of the prevention of such accidents remains the most serious and perplexing in coal-mining operations.

THE paper recently read by Mr. E. M. Speakman on the determination of the principal dimensions of the steam turbine before the Institution of Engineers and Shipbuilders in Scotland, gave rise to a discussion of great interest in which important information was given regarding the application of the steam turbine to marine work. It was pointed out that the trials of the Cunard steamship *Carmania*, the largest turbine steamer yet built, had fulfilled in every way the highest expectations of all connected with the ship.

AT the last meeting of the Institution of Mechanical Engineers a paper on the behaviour of materials of construction under pure shear was read by Mr. E. G. Izod. The results obtained seem to point to the fact that there is no common law connecting the ultimate shearing stress with the ultimate tensile stress. With crystalline materials, such as cast iron or those with very little or no elongation, the former exceeds the latter by as much as 20 per cent. or 25 per cent., while from fibrous material or, more properly speaking, those with a fairly high measure of ductility, the ultimate shear stress may be anything from 0 per cent. to 50 per cent. less than the ultimate tensile stress.

THE second part of the report of the Ontario Bureau of Mines for 1905 is devoted to an important monograph on the cobalt-nickel arsenides and silver deposits of Temiskaming by Mr. W. G. Miller. It covers sixty-six pages, and is illustrated by twenty-eight reproductions of photographs and two geological maps. The deposits were discovered in October, 1903, during the construction of the Temiskaming and Northern Ontario Railway. They occupy narrow, practically vertical fissures cutting through a series of unusually slightly inclined metamorphosed fragmental rocks of Lower Huronian age. A few veins have also been found in the adjacent diabase. The chief ores are native silver, smaltite, niccolite, and chloanthite, with which are associated argentite, pyrargyrite, dyscrasite, erythrite, and other comparatively rare minerals. None of the veins are wide, the maximum being about 18 inches. Some that have been traced 100 feet or more average 1 inch in width. The production during the quarter ended June 30 was 537 tons, the average metallic contents being:—silver, 4·158 per cent.; cobalt, 6·89 per cent.; nickel, 3·09 per cent.; and arsenic, 30·91 per cent. An interesting mineral occurrence is a white clay-like material in the weathered parts of the veins. The white colour of this mineral is due to the intermixture of the green nickel arsenate, annabergite, with the pink cobalt bloom, the mineral showing on analysis 29·30 per cent. of nickel oxide, 6·43 per cent. of cobalt oxide, and 38·31 per cent. of arsenic pentoxide. Hitherto New Caledonia has had practically a monopoly of the world's production of cobalt. Worked primarily for silver with their high values in that metal, the Ontario deposits, with nickel and arsenic as by-products, should prove a strong competitor, even if they should not control absolutely the cobalt market.

MESSRS. F. VIEWEG AND SON, Brunswick, have just published the ninth edition of Prof. A. Bernthsen's "Kurzes Lehrbuch der organischen Chemie." The work appeared originally in 1887; and in the preparation of the present edition Dr. E. Mohr is associated with the author.

STUDENTS and others interested in microscopy will be glad to have their attention directed to new lists of microscopic slides and of second-hand instruments and accessories just issued by Messrs. Clarke and Page, Leadenhall Street, E.C. Special mention should be made of the marine and botanical slides, which are fine examples of cutting, staining, and mounting. A series of objectives corrected for photomicrography is also of noteworthy interest.

A LIST of meteorological instruments for observatories and climatological stations has been received from Messrs. Pastorelli and Rapkin, Ltd., Hatton Garden, E.C. Instruments of various forms for the accurate determination of pressure, temperature, rainfall, and other meteorological elements are described and illustrated in the list, which may be consulted with advantage by anyone desiring to equip a station with serviceable apparatus, or to supplement instruments already in use.

MESSRS. EASON AND SON, LTD., of Dublin, have sent us four of their time-saving indexed diaries for 1906. The "Every Hour" diary provides a convenient record of appointments, special business and events, for any hour of any day during the year. The "Cabinet Scribbling" diary is furnished with a double index for rapid reference, the first arranged as a record for such items as addresses and current literature, the second being to the first of each month.

A COPY of "Hazell's Annual" for 1906 has been received. This twenty-first issue maintains the high reputation of its predecessors. To keep in touch with the important foreign events of the year, numerous foreign biographies have been added, and the text of many treaties included. Some sixteen pages are devoted to scientific matters, most of them being given to scientific progress during 1905.

Prominence is also given to higher educational matters, and the man of science will find much in this section to interest him.

MESSRS. CHARLES GRIFFIN AND CO., LTD., have published the twenty-second annual issue, that for 1905, of the "Official Year-book of the Scientific and Learned Societies of Great Britain and Ireland." This useful work of reference is already well known as a trustworthy guide to the scientific societies and their work. Though the volume is very comprehensive, we miss a reference to the Geographical Association and to the Public Schools Science Masters' Association. The editor might consider the advisability of including associations dealing with educational science.

A NEW vernier rule and scale designed by Mr. S. Irwin Crookes has been received from the maker—Mr. W. H. Harling, 47 Finsbury Pavement, E.C. The rule is divided on one face into inches and eighths of an inch and centimetres and millimetres; the other face has on the edges divisions and numbers representing degrees from 0 to 150, and a barometer scale reading from 20 to 32. A metal vernier slides in a slot cut through the middle of the length of the rule, and it is divided in four different ways to read fractions of the four scales on the rule. The device should be valuable in making students familiar with the use of the vernier on many precise scientific instruments.

THE second annual issue of the "Science Year Book" (5*s.* net), edited by Major B. F. S. Baden-Powell, has been published by Messrs. King, Sell and Olding, Ltd. Several new features have been introduced, and every care appears to have been taken to make the volume serviceable to men of science and others interested in natural knowledge. The year book includes a diary containing at the head of every daily page the astronomical and meteorological particulars of the day likely to be of interest, and blank spaces for recording results of observations. Other characteristics are tables of useful data, an astronomical ephemeris, maps of the constellations, charts of planetary positions during 1906, and various statistics and notes referring to matters not usually included in ordinary calendars and almanacs. There are also short summaries of progress in science during last year, an eclectic bibliographical directory, and a list of scientific books published last year. The year book is thus a convenient and helpful companion for the study, laboratory, or observatory.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN JANUARY:—

Jan. 4. 4h. 12m. to 5h. 10m. Moon occults ξ^2 Ceti (mag. 4·3).
,, 4. 15h. Mercury at greatest elongation, 23° 0′ W.
,, 5. 5h. Venus in conjunction with Uranus, Venus 0° 6′ N.
,, 5. 14h. 45m. to 15h. 16m. Moon occults *f* Tauri (mag. 4·3).
,, 6. 14h. 52m. to 15h. 40m. Moon occults γ Tauri (mag. 3·9).
,, 14. 11h. 1m. to 11h. 58m. Moon occults σ Leonis (mag. 4·1).
,, 15. Venus. Illuminated portion of disc =0·993. Of Mars =0·923.
,, 15. 11h. 2m. Minimum of Algol (β Persei).
,, 18. 7h. 51m. Minimum of Algol (β Persei).
,, 26. 8h. Saturn in conjunction with Moon. Saturn 0° 31′ S.
,, 28. 6h. 17m. to 8h. 14m. Transit of Jupiter's Sat. III.

A FOURTH NEW COMET (1905*e*).—A telegram from the Kiel Centralstelle announces the discovery of another new comet by the Flagstaff observers. This object was discovered, presumably, from the examination of a photograph, by Mr. Lowell, who gives its position on November 29, 1905, at 9h. 27m. (Flagstaff M.T.), as follows:—

R.A. = 22h. 32·2m., dec. = −8° 42′.

The apparent motion of the comet was either in a north-east or a south-west direction, and the photograph showed that the body was accompanied by two tails.

The above position is in the constellation Aquarius, about half-way between ϕ Aquarii and ι Ceti.

NEW ELEMENTS AND EPHEMERIS FOR COMET 1905*c*.—A new set of elements and a daily ephemeris for comet 1905*c* (Giacobini) are given by Herr E. Strömgren in No. 4062 of the *Astronomische Nachrichten.*

These elements, and an extract from the ephemeris, are given below.

T = 1906 Jan. 22·666 (*M.T. Berlin*).

$$\left.\begin{array}{l} \infty = 198^\circ\ 21'\!\cdot\!67 \\ \Omega = 91\ \ 55\cdot27 \\ i = 43\ \ 37\cdot08 \end{array}\right\} 1905\cdot0$$

$$\log q = 9\cdot34978$$

Ephemeris (12*h. M.T. Berlin*).

1906	α (true) h. m. s.	δ (true) ° ′	log γ	log Δ	Brightness
Jan. 5	17 23 54	− 1 35·7	9·7701	0·0425	7·97
,, 7	17 39 28	− 3 53·5	9·7313	0·0425	9·53
,, 9	17 55 31	− 6 15·9	9·6881	0·0441	11·53
,, 11	18 12 10	− 8 42·5	9·6398	0·0473	14·20
,, 13	18 29 33	− 11 12·8	9·5856	0·0520	17·83

The above positions are plotted on the accompanying chart, which shows approximately the apparent positions of the comet among the stars on the dates indicated.

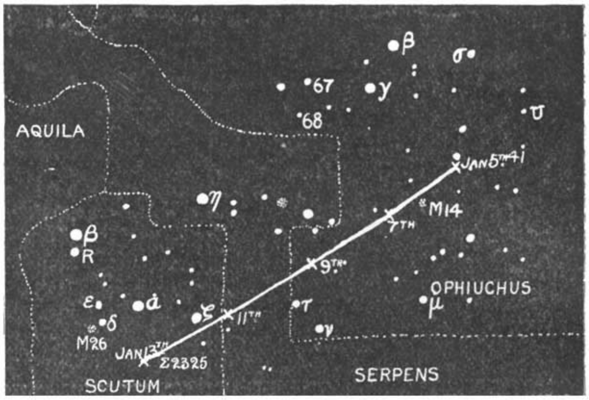

FIG. 1.—Path of Comet 1905*c*, January 5–13, 1906.

THE EXPECTED RETURN OF COMET 1892 V.—In *Circular* No. 84 from the Kiel Centralstelle, M. J. Coniel gives several provisional search-ephemerides, showing positions up to January 6·5, for comet 1892 V.

This comet was discovered by Holmes on November 6, 1892, and was observed during its apparition in 1899, when it passed through its perihelion on April 28. Its period is given by Zwiers as 6·874 years.

MICROMETER MEASURES OF DOUBLE STARS.—The results of a series of micrometer measures of eighty-three double stars, taken from the Struve, Burnham, and Hussey catalogues, are published in No. 4054 of the *Astronomische Nachrichten* by Herr H. E. Lau. The observations were made during March, 1905, with the Urania-Sternwarte (Copenhagen) refractor, of 246 mm. aperture and 4·1 metres focal length, fitted with a Cooke position micrometer.

For each double, the time of observation, the position-angle, the distance, the magnitudes of the components and the power used are given, whilst short comparisons with other measures and notes regarding the probable character and motion are generally added.